



NAVAL
POSTGRADUATE
SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

Intellectual Capital

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 November, 2004

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I. INTRODUCTION

The purpose of this MBA Project was to investigate and provide a comprehensive overview the historical and current efforts directed at valuing intellectual capital. This project was conducted with the sponsorship and assistance of the Office of Military Base Retention, of the California Business, Transportation and Housing Agency. The goal of this project was to identify and document both the history of valuing human capital, and the models currently in use throughout the private sector. Additionally, an effort was made to develop a definition that would be appropriate for use in a governmental setting and to develop a working model that can be used to manage intellectual capital within the Department of Defense (DoD).

This project closely follows the historical development of valuing human capital, beginning with the efforts of Sir William Petty in 1691 and briefly describes the work of Adam Smith, William Farr and others in a methodical manner leading up to the development in the 1960s of the idea of intellectual capital. A continuation of the history is provided up to contemporary efforts in the area.

This paper also examines various definitions of intellectual capital and presents a specific definition for use in a governmental or not for profit setting. Additionally, a thorough examination of models currently in use throughout the private sector is presented, and a specific working model is developed for use within the DoD.

Four methods of measuring intangibles are specifically discussed. They are the Direct Intellectual Capital methods (DIC), Market Capitalization Methods (MCM), Return on Assets methods (ROA), and Scorecard Methods (SC). Of the four, the SC method shows the most promise for use within the DoD.

Finally, an SC method model, based on the Skandia Navigator has been refined for use within the DoD. A comprehensive list of possible metrics is thoroughly discussed and an example financial statement addendum has been provided.

II. THE HISTORY OF VALUING HUMAN CAPITAL

What is the value of a human being? The idea of comparing measurable wealth to the intangible value of a human being is attractive, but elusive. The recent widespread interest in the subject could lead to the erroneous conclusion that the question and theories on the subject are new. They are not. In 1691, Sir William Petty postulated that labor should be included in any estimate of national wealth. He used the concept of human capital to explain various economic conditions and phenomenon, including the economic effects of migration, the value of a human life destroyed in war, and the power of England.¹ “Petty estimated the value of the stock of human capital by capitalizing the wage bill to perpetuity, at the market interest rate; the wage bill he determined by deducting property income from national income (Hull, 1899, I, 108).”² Not only was this method one of the first used to estimate the value of human capital, it is a method that has displayed exceptional staying power.

In 1776 Adam Smith discussed the value of labor extensively in what is perhaps the seminal work on economics in modern times, *The Wealth of Nations*. He went as far as to assign an exact value to a human in North America (£100)³. He also clearly demonstrated that the value of human capital in one area is not equal to the value of human capital in another;⁴ pointing out that while having children in industrialized England would drain the resources of a family; a large family in the largely agrarian society of North America marked an increased capacity for wealth creation.⁵

William Farr used a method similar to Petty’s to value human capital in 1853. He attempted to determine the net present value of a human by estimating all future income, using actuarial tables to approximate future earnings. Farr “advocated the substitution for

¹ From Ronald A. Wykstra, *The Copyright Book: Human Capital Formation and Manpower Development* (The Free Press, 1971), 3.

² From Ronald A. Wykstra, *The Copyright Book: Human Capital Formation and Manpower Development* (The Free Press, 1971), 3.

³ From Adam Smith, *The Copyright Book: The Wealth of Nations* (New York: Alfred A. Knopf, 1991), 62.

⁴ From Adam Smith, *The Copyright Book: The Wealth of Nations* (New York: Alfred A. Knopf, 1991), 62-100.

⁵ From Adam Smith, *The Copyright Book: The Wealth of Nations* (New York: Alfred A. Knopf, 1991), 62.

the existing English income tax system of a property tax that would include property consisting of the capitalized value of earning capacity.”⁶

Historically, the only competing theory for human value estimation has been the cost-of-production method put forth by Ernst Engel in 1883. Engel acknowledged Petty’s view, but decided that the method was inadequate to estimate the value of a superior mind. “Since, however, their rearing was a cost to their parents, it might be estimated and taken as a measure of their monetary value to society.”⁷

Engel developed a mathematical formula for estimating the value of a person, based on age and class level. His efforts were continuously refined, most notably by Dublin and Lotka, life-insurance executives in the 1930s who used a complex formula to determine how much life insurance a man should carry.⁸

The leap from the valuation of human capital to the management of intellectual capital is more recent. “The notions of intellectual capital were first advanced by economist John Kenneth Galbraith who wrote the following to fellow economist Michael Kalecki in 1969: I wonder if you realise how much those of us the world around have owed to the intellectual capital you have provided over these last decades.”⁹

Thomas Stewart, in a ground-breaking cover-story in Fortune Magazine entitled “Brainpower”(1991), is credited with providing the main impetus for a new world of intellectual capitalists.¹⁰ In particular, his article helped launch the career of Lief Edvinsson at Skandia. A few months after publishing the article Stewart received a call from Edvinsson who was coming to New York from his office in Sweden at Skandia. He wanted to meet and discuss the subject of intellectual capital. “In my office he handed me a business card. *Lief Edvinsson*, it read, *Director, Intellectual Capital*. I was floored. Lief explained that he had been interviewing for a job with Jan Carende, head of

⁶ From Ronald A. Wykstra, *The Copyright Book: Human Capital Formation and Manpower Development* (The Free Press, 1971), 4.

⁷ From Ronald A. Wykstra, *The Copyright Book: Human Capital Formation and Manpower Development* (The Free Press, 1971), 4.

⁸ From Ronald A. Wykstra, *The Copyright Book: Human Capital Formation and Manpower Development* (The Free Press, 1971), 6.

⁹ From Nick Bontis, *The Copyright Paper: Assessing knowledge Assets: A Review of the Models Used to Measure Intellectual Capital*, (2000), 1.

¹⁰ From Nick Bontis, *The Copyright Paper: Assessing knowledge Assets: A Review of the Models Used to Measure Intellectual Capital*, (2000), 1.

Skandia's Assurance and Financial Services Division, and had shown 'Brainpower' to him, saying, 'This is what your company should do: Manage intellectual capital.' Carendie agreed, and said: 'You do it.'"¹¹

¹¹ From Thomas A. Stewart, *The Copyright Book: Intellectual Capital* (Doubleday, 1997), xv.

III. DEFINING INTELLECTUAL CAPITAL

Managing knowledge assets is an increasingly important part of running a successful business, yet defining intellectual capital is a difficult proposition. The increasing use of the term suggests that industry has determined that some sort of correlation exists between the ability to manage these assets and the creation of competitive advantage. Many descriptions of intellectual capital in the relevant literature are quite specific and created by individuals for use within a specific industry or company.

Skandia, an insurance conglomerate based in Stockholm, Sweden and leading pioneer in the area of knowledge management describes intellectual capital as an integral part of the corporation's market value. Figure 1 illustrates the Skandia vision of intellectual capital.

In this model, "Structural Capital is the hardware, software, databases, organizational structure, patents, trademarks, and everything else of organizational capability that supports those employees' productivity - in other words, everything that gets left behind at the office when employees go home. Human Capital is defined as the combined knowledge, skill, innovativeness, and ability of the company's individual employees to meet the task at hand."¹² "Intellectual Capital equals the sum of human and structural capital."¹³

¹² From Nick Bontis, The Copyright Paper: Assessing knowledge Assets: A Review of the Models Used to Measure Intellectual Capital, (2000), 5.

¹³ From Nick Bontis, The Copyright Paper: Assessing knowledge Assets: A Review of the Models Used to Measure Intellectual Capital, (2000), 5.

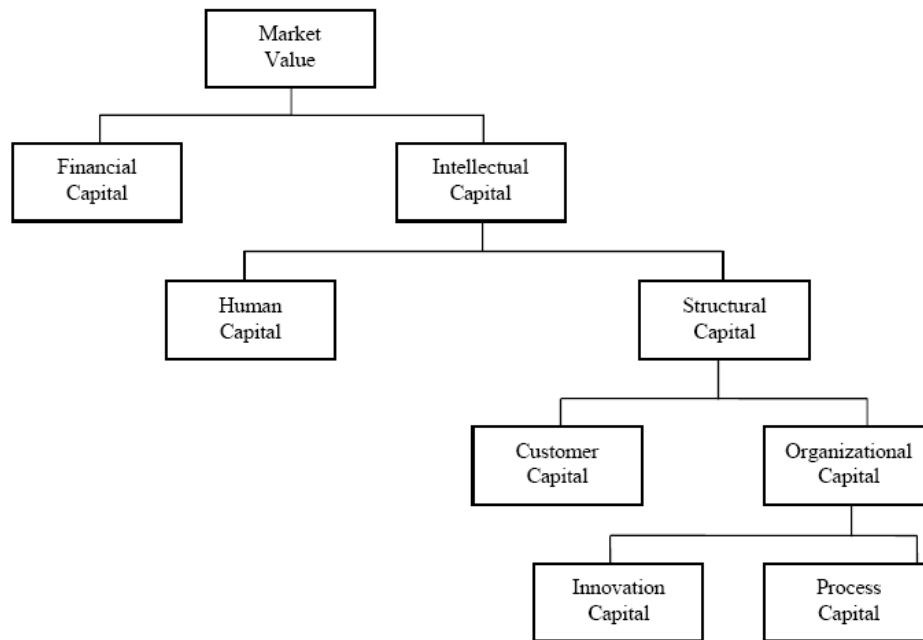


Fig. 1 ¹⁴

According to Edvinsson and Malone (1997), IC encompasses the applied experience, organizational technology, customer relationships and professional skills that provide Skandia with a competitive advantage in the market.” Lief Edvinsson, Chief Knowledge Officer at Skandia, defines IC as follows: “Intellectual Capital is the possession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide Skandia with a competitive edge in the market.”¹⁵

Other characterizations abound. “Stewart (1997) defines intellectual capital as intellectual material – knowledge, information, intellectual property and experience – that

¹⁴ From Nick Bontis, *The Copyright Paper: Assessing knowledge Assets: A Review of the Models Used to Measure Intellectual Capital*, (2000), 6.

¹⁵ From Leif Edvinsson and Michael S. Malone, *The Copyright Book: Intellectual Capital* (Harper business, 1997), 44.

can be put to use to create wealth”¹⁶. These descriptions have a decidedly private enterprise slant, and are not broad enough for DoD use.

The California Office of Military Base Retention Business, Transportation & Housing Agency (OMBRR) has suggested the following: “the value/cost of replacement (if possible) of individual/collective pools of intellect, educational systems, corporate experience, synergistic interface (corporate-private-public collaboration) and new technologies that contribute to DoD mission accomplishment and cutting edge research, design, test and evaluation (RDT&E) in support of US Defense priorities.”¹⁷ This version incorporates the key idea of synergistic interface and addresses several possible settings for IC development, but it neglects alternative measurements of intellectual capital. Any definition proposed should be broad enough to be applied to any DoD entity, yet specific enough to accurately capture the varied aspects of this complex concept.

Incorporating the idea of providing a competitive edge is particularly problematic because this concept does not translate easily into governmental and non-profit terms. This notion is essential to the definition of intellectual capital, however, and so some equivalent must be devised. Mission success is comparable, but this term has too many connotations to allow it to be used as a defining metric.

Relevance is a more useful term. Defined as “Pertinence to the matter at hand”¹⁸ or “Applicability to social issues”¹⁹ this term is better used in this environment as a means to evaluate an institution. When describing governmental or educational institutions, relevance is the ability of an institution to provide value that can’t be economically achieved in other ways.

This definition of relevance leads to an improved definition of IC that incorporates the most useful parts of the above descriptions, as applied to DoD specific entities: Intellectual Capital is the value associated with the knowledge, applied experience, organizational technology, synergistic interface, and professional skills that provide an organization with relevance within the DoD.

¹⁶ From Nick Bontis, *The Copyright Paper: Assessing knowledge Assets: A Review of the Models Used to Measure Intellectual Capital*, (2000), 2.

¹⁷ OMBRR

¹⁸ www.dictionary.com, Sep 2004

¹⁹ www.dictionary.com, Sep 2004

IV. INTELLECTUAL CAPITAL VALUATION

A. DIFFICULTIES MEASURING INTANGIBLES

Estimating the value of intellectual capital at an institution is a very difficult proposition. Intellectual capital varies in value from location to location, as discussed by Adam Smith; therefore developing a comprehensive tool for comparing the value of intellectual capital at various institutions is problematic.

A comprehensive examination of the literature on the subject leads to the conclusion that while the measurement of intellectual capital within an institution, especially at set intervals over some period of time, can prove to be an effective management tool, it is not helpful when attempting to compare two institutions, even similar institutions.

According to Manish Chandra and Sandeep Biswas professors at the Academy of Higher Education, Greater Noida, India and the Institute for Integrated Learning in Management at New Delhi, India “Intellectual capital (IC) is rapidly becoming a very important measure of a company’s future performance. It is therefore vital that its indicators and measures are developed and used for the strategic space in the competitive horizon of the company. The rapid change in our society and business environment has made the “Knowledge” the new engine of corporate development. Today the success of any enterprise is measured in terms of the “Continuous Innovation”, relying on new technologies, skills and knowledge of employees rather than assets such as plant and machinery.

From the fact that the accounting system is unable to cope with intangibles one might conclude that we need to ‘repair’ the balance sheet. Existing financial statements recognize intangible assets only when they are acquired from others. To repair the balance sheet one might argue that we also need to develop a basis for the recognition, valuation and capitalization of internally generated intangible resources.

A strong argument can be made that this is impossible (Andriessen, 2001). The system of double-entry bookkeeping is based on transactions. Intangible resources are a spoilsport. Their unique characteristics do not fit in a transaction-based system. There are no rival assets. Their value can increase or decrease without a transaction. The benefits of intangible resources are much more uncertain than the benefits of tangible assets. If at all it is possible with intangible resources to talk about

depreciation or impairment, it is much more a function of the competitive advantage of the company than is the case with tangible assets.

Finally, intangible resources are impossible to add up. Another reason for the financial valuation of intangibles could be to fill the gap between the market and the book value of enterprises. That also seems impossible because comparing the two is like comparing apples and pears. The book value represents the historic value of the assets of a company not yet amortized. The market value is equal to the perceived present value of the future cash flow of the company (Figure 1).

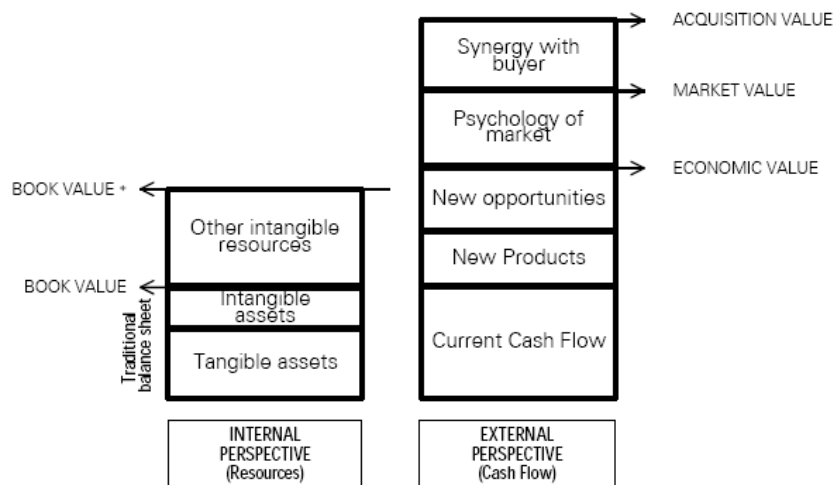


Figure 2 Two perspectives on company value²⁰

Talking about book value means taking an internal perspective on the company and listing its resources: tangible, intangible or financial. Talking about market value means taking an external perspective on the company looking at cash flows that will be generated by current products, new products, and new opportunities. It also involves the psychology of the market, including puffery or pessimism. These two perspectives cannot be subtracted. Pike et al. (2001) add another argument by stressing the fact that all resources of a company combine and interact with each other. The equation $\text{Market Value} = \text{Book Value} + \text{Intellectual Capital}$ is

²⁰ From Daniel Andriessen, The Financial Value of Intangibles: Searching for the Holy Grail (Paper presented at the 5th World Congress on the Management of Intellectual Capital, January 16-18, 2002), 3.

incorrect since the variables are not separable as required by the equation.²¹

B. MEASURING INTANGIBLES

“Market-to-book ratios of U.S. companies are now roughly 2-to-1, roughly double the average between 1945 through 1990. Price/earnings ratios in the U.S. are at 25, vs. a historic average of about 17...At the same time, corporate investment in tangible capital stock is declining. The ratio of revenue to the sum of property, plant, equipment and inventory for U.S. companies has increased by some 20% over the past 25 years.”²²

“According to Morgan Stanley’s World Index, the average value of U.S. companies typically ranges from two to nine times book value. Microsoft, for example, saw its stock climb to more than \$100 per share when it announced Windows 95. As a result, Microsoft became more valuable than Boeing overnight.

According to Sveiby “still, there exists no comprehensive system for measuring intangible assets that uses money as the common denominator and at the same time is practical and useful for managers. Depending on the purpose for measuring, I do not think such a system is necessary, either. Knowledge flows and intangible assets are essentially non-financial.”

“The inability of the accounting system to cope with intangibles often is seen as problem. As a consequence proper management information on intangibles is lacking, leading to an inability of management to manage intangibles properly. Authors like Kaplan and Norton (1996), Stewart (1997), and Kerssens (1999) use phrases like “If you can’t measure it, you can’t manage it” to justify the search for new measures to fill the gap.”²³

²¹ From Daniel Andriessen, The Financial Value of Intangibles: Searching for the Holy Grail (Paper presented at the 5th World Congress on the Management of Intellectual Capital, January 16-18, 2002), 3-4.

²² From Lowell L. Bryan, "Stocks Overvalued? Not in the New Economy," in the column *Manager's Journal*, The Wall Street Journal, November 3, 1997, A24.

²³ From Daniel Andriessen, The Financial Value of Intangibles: Searching for the Holy Grail (Paper presented at the 5th World Congress on the Management of Intellectual Capital, January 16-18, 2002), 2.

“Traditional accounting measures can no longer adequately determine the real value of companies. But if intangible assets cannot be measured, how can they be managed? Corporations and accounting firms alike are taking this problem seriously and have been working to develop systems to identify, value, and manage intellectual capital.”²⁴

There is a significant amount of value to be gained in measuring tracking intellectual capital. “As the economy is becoming more knowledge driven the parameters for growth have changed from managing efficiency to managing knowledge.”²⁵ In order to manage a company effectively in today environment, some method of valuation for intellectual capital must be employed.

The intangible assets or Intellectual capital recognized today in the financial statement of an enterprise, are the intellectual property such as patents and trademarks, and acquired items such as goodwill etc. Although it is not possible to assign monetary values to most intellectually driven assets, they need to be considered for strategic advantage.”²⁶ Methods should therefore be developed for an internal method of valuing intellectual capital that can be used to manage these assets over a period of time.

C. THE FOUR APPROACHES FOR MEASURING INTANGIBLES

The suggested measuring approaches for intangibles fall into four main categories of measurement approaches. These categories are an extension of the classifications suggested by Luthy (1998) and Williams (2000).

²⁴ From Brinker, Barry, Copyright 2000, Intellectual Capital: Tomorrow's Asset, Today's Challenge <http://www.cpavision.org/vision/wpaper05b.cfm>.

²⁵ From Chandra and Biswas. Copyright Paper, Intellectual Capital Management: A Strategic paradigm for innovation in an enterprise, 1.

²⁶ From Karl-Erik Sveiby, Copyright Paper: Methods for Measuring Intangible Assets (Internet version, July 2004), <http://www.sveiby.com/articles/IntangibleMethods.html>, 1.

1. Direct Intellectual Capital methods (DIC)

Estimate the \$-value of intangible assets by identifying its various components. Once these components are identified, they can be directly evaluated, either individually or as an aggregated coefficient.

2. Market Capitalization Methods (MCM).

Calculate the difference between a company's market capitalization and its stockholders' equity as the value of its intellectual capital or intangible assets.

3. Return on Assets methods (ROA)

Average pre-tax earnings of a company for a period of time are divided by the average tangible assets of the company. The result is a company ROA that is then compared with its industry average. The difference is multiplied by the company's average tangible assets to calculate an average annual earning from the Intangibles. Dividing the above-average earnings by the company's average cost of capital or an interest rate, one can derive an estimate of the value of its intangible assets or intellectual capital.

4. Scorecard Methods (SC)

The various components of intangible assets or intellectual capital are identified and indicators and indices are generated and reported in scorecards or as graphs. SC methods are similar to DIS methods, except that no estimate is made of the \$-value of the Intangible assets. A composite index may or may not be produced.

The methods offer different advantages. The methods offering \$-valuations, such as ROA and MCM methods are useful in merger & acquisition situations and for stock market valuations. They can also be used for comparisons between companies within the same industry and they are good for illustrating the financial value of Intangible assets, a feature, which tends to get the attention of the CEOs. Finally, because they build on long established accounting rules they are easily communicated in the accounting profession. Their disadvantages are that by translating everything into money terms they can be superficial. The ROA methods are very sensitive to interest rate and discounting rate assumptions and the methods that measure only on the organisation level are of limited use for management purposes below board level. Several of

them are of no use for non-profit organisations, internal departments and public sector organisations; this is particularly true of the MCM methods.

The advantages of the DIS and SC methods are that they can create a more comprehensive picture of an organisation's health than financial metrics and that they can be easily applied at any level of an organisation. They measure closer to an event and reporting can therefore be faster and more accurate than pure financial measures. Since they do not need to measure in financial terms they are very useful for non-profit organisations, internal departments and public sector organisations and for environmental and social purposes. Their disadvantages are that the indicators are contextual and have to be customised for each organisation and each purpose, which makes comparisons very difficult. The methods are also new and not easily accepted by societies and managers who are used to see everything from a pure financial perspective. The comprehensive approaches can generate oceans of data, which are hard to analyse and to communicate.²⁷

²⁷ From Karl-Erik Sveiby, Copyright Paper: Methods for Measuring Intangible Assets (Internet version, July 2004), <http://www.sveiby.com/articles/IntangibleMethods.html>, 2-3.

Approx. Dvlp. year	Label	Major Proponent	Category	Description of Measure
2004	Topplinjen/Business IQ	<i>Sandvik (2004)</i>	SC	A combination of four indices; Identity Index, Human Capital Index, Knowledge Capital Index, Reputation Index. Developed in Norway by consulting firm Humankapitalgruppen.
2003	Danish guidelines	<i>Mouritzen, Bukh & al. (2003)</i>	SC	A recommendation by government-sponsored research project for how Danish firms should report their intangibles publicly. Intellectual capital statements consist of 1) a knowledge narrative, 2) a set of management challenges, 3) a number of initiatives and 4) relevant indicators.
2002	IC Rating™	<i>Edvinsson (2002)</i>	SC	An extension of the Skandia Navigator framework incorporating ideas from the Intangible Assets Monitor; rating <i>efficiency</i> , <i>renewal</i> and <i>risk</i> .
2002	Value Chain Scoreboard™	<i>Lev B. (2002)</i>	SC	A matrix of non-financial indicators arranged in three categories according to the cycle of development: Discovery/Learning, Implementation, Commercialization.
2002	Meritum guidelines	<i>Meritum Guidelines (2002)</i>	SC	An EU-sponsored research project, which has yielded a framework for management and disclosure of Intangible Assets. 1) define strategic objectives, 2) identify the intangible resources, 3) actions to develop intangible resources. Three classes of intangibles: Human Capital, Structural Capital and Relationship Capital.
2001	Knowledge Audit Cycle	<i>Marr & Schiuma (2001)</i>	SC	A method for assessing six knowledge dimensions of an organisation's capabilities in four steps. 1) Define key knowledge assets. 2) Identify key knowledge processes. 3) Plan actions on knowledge processes. 4) Implement and monitor improvement, then return to 1).
2000	The Value Explorer™	<i>Andriessen & Tiessen (2000)</i>	DIC	Accounting methodology proposed by KMPG for calculating and allocating value to 5 types of intangibles: (1) Assets and endowments, (2) Skills & tacit knowledge, (3) Collective values and norms, (4) Technology and explicit knowledge, (5) Primary and management processes.
2000	Intellectual Asset Valuation	<i>Sullivan (2000)</i>	DIC	Methodology for assessing the value of Intellectual Property.
2000	Total Value Creation, TVC™	<i>Anderson & McLean (2000)</i>	DIC	A project initiated by the Canadian Institute of Chartered Accountants. TVC uses discounted projected cash-flows to re-examine how events affect planned activities.
1999	Knowledge Capital Earnings	<i>Lev (1999)</i>	ROA	Knowledge Capital Earnings are calculated as the portion of normalised earnings over and above expected earnings attributable to book assets.
1998	Inclusive Valuation Methodology (IVM)	<i>McPherson (1998)</i>	DIC	Uses hierarchies of weighted indicators that are combined, and focuses on relative rather than absolute values. Combined Value Added = Monetary Value Added combined with Intangible Value Added.
1998	Accounting for the Future (AFTF)	<i>Nash H. (1998)</i>	DIC	A system of projected discounted cash-flows. The difference between AFTF value at the end and the beginning of the period is the value added during the period.
1998	Investor assigned market value (IAMV™)	<i>Standfield (1998)</i>	MCM	Takes the Company's True Value to be its stock market value and divides it into Tangible Capital + (Realised IC + IC Erosion + SCA (Sustainable Competitive Advantage))
1997	Market-to-Book Value	<i>Stewart (1997)</i> <i>Luthy (1998)</i>	MCM	The value of intellectual capital is considered to be the difference between the firm's stock market value and the company's book value.
1997	Economic Value Added (EVA™)	<i>Stewart (1997)</i>	ROA	Calculated by adjusting the firm's disclosed profit with charges related to intangibles. Changes in EVA provide an indication of whether the firm's intellectual capital is productive or not.
1997	Calculated Intangible Value	<i>Stewart (1997)</i> <i>Luthy (1998)</i>	ROA	Calculates the excess return on hard assets then uses this figure as a basis for determining the proportion of return attributable to intangible assets.

1997	Value Added Intellectual Coefficient (VAIC™)	<i>Pulic (1997)</i>	ROA (does not quite fit any of the categories)	Measures how much and how efficiently intellectual capital and capital employed create value based on the relationship to three major components: (1) capital employed; (2) human capital; and (3) structural capital.
1997	IC-Index™	<i>Roos, Roos, Dragonetti and Edvinsson (1997)</i>	SC	Consolidates all individual indicators representing intellectual properties and components into a single index. Changes in the index are then related to changes in the firm's market valuation.
1996	Technology Broker	<i>Brooking (1996)</i>	DIC	Value of intellectual capital of a firm is assessed based on diagnostic analysis of a firm's response to twenty questions covering four major components of intellectual capital.
1996	Citation-Weighted Patents	<i>Bontis (1996)</i>	DIC	A technology factor is calculated based on the patents developed by a firm. Intellectual capital and its performance is measured based on the impact of research development efforts on a series of indices, such as number of patents and cost of patents to sales turnover, that describe the firm's patents.
1994	Skandia Navigator™	<i>Edvinsson and Malone (1997)</i>	SC	Intellectual capital is measured through the analysis of up to 164 metric measures (91 intellectually based and 73 traditional metrics) that cover five components: (1) financial; (2) customer; (3) process; (4) renewal and development; and (5) human.
1994	Intangible Asset Monitor	<i>Sveiby (1997)</i>	SC	Management selects indicators, based on the strategic objectives of the firm, to measure four aspects of creating value from 3 classes of intangible assets labeled: People's competence, Internal Structure, External Structure. Value Creation modes are: (1) growth (2) renewal; (3) utilization/efficiency; and (4) risk reduction/stability.
1992	Balanced Score Card	<i>Kaplan and Norton (1992)</i>	SC	A company's performance is measured by indicators covering four major focus perspectives: (1) financial perspective; (2) customer perspective; (3) internal process perspective; and (4) learning perspective. The indicators are based on the strategic objectives of the firm.
1990	HR statement	<i>Ahonen (1998)</i>	DIC	A management application of HRCA widespread in Finland. The <i>HR profit and loss account</i> divides personnel related costs into three classes for the human resource costs: renewal costs, development costs, and exhaustion costs. 150 listed Finnish companies prepared an HR statement in 1999.
1989	The Invisible Balance Sheet	<i>Sveiby (1989)</i>	MCM	The difference between the stock market value of a firm and its net book value is explained by three interrelated "families" of capital; Human Capital, Organisational Capital and Customer Capital. The three categories first published in this book have become a de facto standard.
1988	Human Resource Costing & Accounting (HRCA)	<i>Johansson (1996)</i>	DIC	Calculates the hidden impact of HR related costs, which reduce a firm's profits. Adjustments are made to the P&L. Intellectual capital is measured by calculation of the contribution of human assets held by the company divided by capitalized salary expenditures.
1970's	Human Resource Costing & Accounting (HRCA)	<i>Flamholtz (1985)</i>	DIC	The pioneering work on HR accounting. A number of methods for calculating the value of human resources.
1950's	Tobin's q	<i>Tobin J.</i>	MCM	The "q" is the ratio of the stock market value of the firm divided by the replacement cost of its assets. Changes in "q" provide a proxy for measuring effective performance or not of a firm's intellectual capital. Developed by the Nobel Laureate economist James Tobin in the 1950's.

Table: I: Erick Sveiby's compilation of: IC valuation methods

V. PROPOSED MODEL

A. MODEL CHOICE

A careful analysis of the four distinct methods was conducted in an effort to determine the most applicable approach to valuing and managing intellectual capital within a Department of Defense (DoD) organization.

The Direct Intellectual Capital methods are insufficient based on the difficulties associated with converting intangible assets to tangible assets. A heuristic method of converting intangible assets to tangible ones negates the intrinsic value of this method. A rule of thumb method simply does not accurately portray the value of intangible assets within an institution.

Market Capitalization Methods (MCM) and Return on Assets (ROA) methods are obviously inappropriate given the nature of Government entities. “They can be ignored from the outset since they are fundamentally based on financial figures, augmented by intangible assets. Furthermore ROA approaches tend to be based on industry comparisons rather than the company itself and many of the MCM approaches view intellectual capital as a separable entity from book value.”²⁸

“Non-monetary intellectual capital scorecards, may yield more reliable results because they use the more natural measurement scales for each indicator, instead of converting everything into monetary figures. An intellectual capital scorecard will group indicators in a consistent and coherent framework.”²⁹

Given the difficulties of measuring intangibles and converting them to tangible metrics, the strengths and weaknesses of the various methods, and the nature of educational, not for profit, and governmental institutions, the scorecard method seems best suited for analysis at these types of institutions.

²⁸ From Pike, Roos, Copyright Paper: Mathematics and Modern Business Management (25th McMaster World Congress Managing Intellectual Capital, Hamilton Ontario, January 14-16, 2004), 5.

²⁹ From Hennie Daniels and Henk Noordhuis, Copyright Paper: Management of intellectual capital by optimal portfolio selection, (4th International Conference on Practical Aspects of Knowledge Management, Vienna, published in: Practical Aspects of Knowledge Management, Springer Lecture Notes on Artificial Intelligence, no. 2569, pp.613-619, 2002), 3.

B. THE SKANDIA NAVIGATOR

Among the various scorecard methods, the Skandia Navigator has the most appeal because of its inherent flexibility and broad applicability. The Navigator can be easily tailored to any organization because of the nature of the analysis. The Navigator intentionally requires upper management at any entity employing the system to pare down the metrics to a set that is not only useful, but also readily obtainable.

Skandia is considered the first large company to have made a truly coherent effort at measuring knowledge assets (Bontis, 1996; Huseman and Goodman, 1999). Skandia first developed its IC report internally in 1985, and became the first company to issue an IC addendum accompanying its traditional financial report to shareholders in 1994. Other companies including Dow Chemical's initiatives in valuing its R&D and patent process have relied extensively on Skandia's multi-dimensional conceptualization of organizational value. Leif Edvinsson, the chief architect behind Skandia's initiatives developed a dynamic and holistic IC reporting model called the Navigator with five areas of focus: financial, customer, process, renewal and development, and human capital. This new accounting taxonomy sought to identify the roots of a company's value by measuring hidden dynamic factors that underlie "the visible company of buildings and products" (Edvinsson and Malone, 1997, p.11). According to Skandia's model the hidden factors of human and structural capital when added together comprise intellectual capital.

Human Capital is defined as the combined knowledge, skill, innovativeness, and ability of the company's individual employees to meet the task at hand. It also includes the company's values, culture, and philosophy. Human capital cannot be owned by the company.

Structural Capital is the hardware, software, databases, organizational structure, patents, trademarks, and everything else of organizational capability that supports those employees' productivity - in other words, everything that gets left behind at the office when employees go home. Structural capital also provides customer capital, the relationships developed with key customers. Unlike human capital, structural capital can be owned and thereby traded.

Intellectual Capital equals the sum of human and structural capital. According to Edvinsson and Malone (1997), IC encompasses the applied experience, organizational technology, customer relationships and professional skills that provide Skandia with a competitive advantage in the market.

In sum, Skandia's value scheme contains both financial and non-financial building blocks that combine to estimate the company's market value. This conceptualization achieved a balance for Skandia in trying to represent both financial and non-financial reporting, uncovering and

visualizing its intellectual capital, tying its strategic vision to the company's core competencies reflecting knowledge-sharing technology and knowledge assets beyond intellectual property, and reflecting better its market value.³⁰

³⁰ From Nick Bontis, The Copyright Paper: Assessing knowledge Assets: A Review of the Models Used to Measure Intellectual Capital, (2000), 4-5.

C. MODEL MECHANICS

The Skandia Navigator seeks to quantify the value of intellectual capital for internal management purposes. It divides intellectual capital into five focus areas. Those areas are Human Focus, Financial Focus, Customer Focus, Process Focus, and Renewal & Development Focus. Each focus contains a series of metrics.

While it is important to select metrics that are most suitable for your institution, it is key to identify metrics that can be measured in a consistent manner from year to year. The list of Skandia Focus areas and metrics as tailored for DoD use is provided in Figure 3 below.

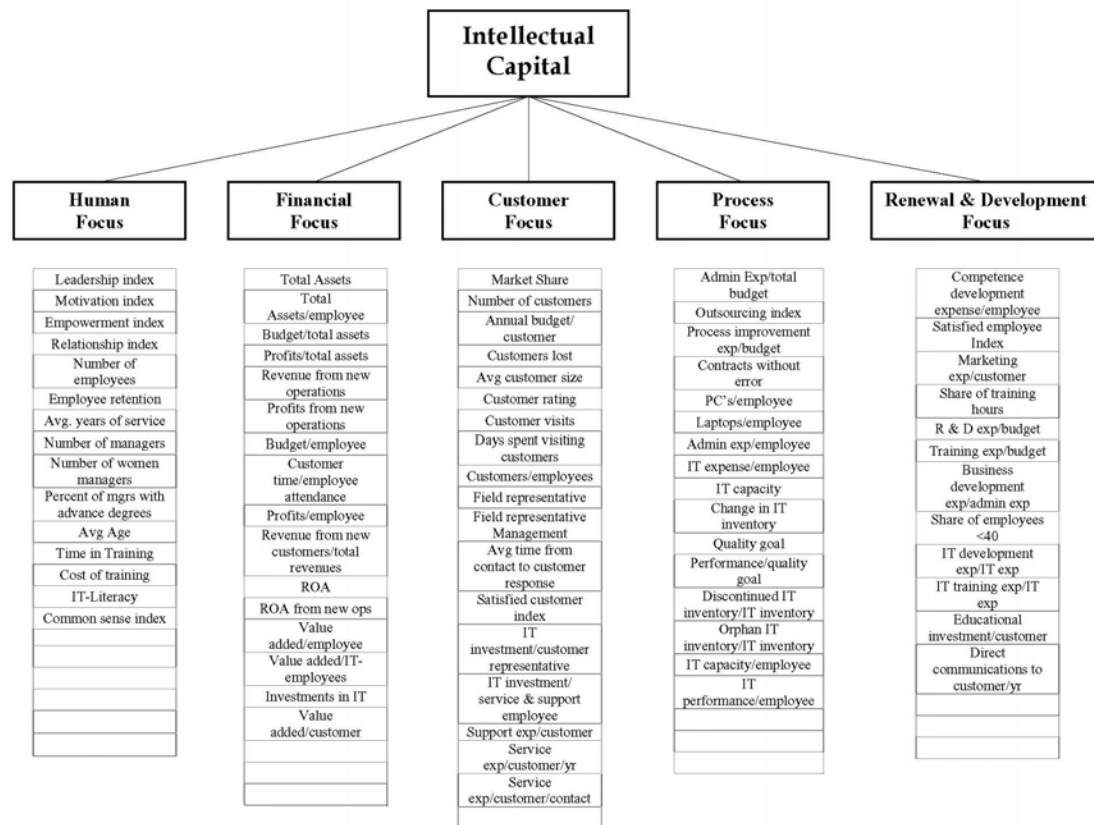


Figure 3. Skandia Navigator Focus Area and Metrics Tailored for DoD Application.

“The Skandia IC report contains 91 different measurements. That’s a daunting number, and even assuming that companies will institutionalize the measurement of these indices and use considerable computing power to do so, it will remain a monumental task.”³¹

“So, what we need to do first with our new universal IC reporting standard is to cut out the redundant and less important indices, as well as those that will be inordinately difficult to measure, so that we are left with a list comparable in length and complexity to the Skandia original. The others can be preserved for future elaboration as the measurement systems become more sophisticated.”³²

The DoD, and Governmental institutions in general might use a set of metrics like those listed below to begin their analysis.

Human focus

Leadership Index: Skandia uses internal polls, questionnaires, and evaluations to develop an index that measures individual abilities within the company. A similar system could be used within the DoD based on trait averages on Fitness Reports.

Motivation Index: Skandia uses internal polls, questionnaires, and evaluations to develop an index that measures satisfied customers, motivation and competence of staff, and quality and effectiveness of administrators

Empowerment Index: For this index, Skandia hired SIFO, the Swedish Institute of Public Opinion Research, to survey company employees to determine how much control they feel over their daily work.

Relationship Index: Synergistic value is created by the relationships employees develop over time.

Number of Employees: A numerical count utilized in the formation of other ratios such as budget/number of employees and as a stand alone metric indicating efficiency.

Employee Retention: High turnover rates can be an indicator of lowering intellectual capital reserves.

³¹ From Leif Edvinsson and Michael S. Malone, *The Copyright Book: Intellectual Capital* (Harper business, 1997), 150.

³² From Leif Edvinsson and Michael S. Malone, *The Copyright Book: Intellectual Capital* (Harper business, 1997), 151.

Avg. Years of Service: High turnover rates can be an indicator of lowering intellectual capital reserves.

Number of Managers: An indicator of efficiency that can also be used in the formation of ratios.

Number of Woman Managers: At first glance, this may appear to be simply one more manifestation of political correctness, a sop to interest groups. But the fact is that the new corporation, with its' diverse management needs, will require personality types, life experiences, and management styles that are unprecedented in the middle corporate ranks. Thus, diversity, more than just an end in itself, may prove to be a vital competitive factor.

Percent of Managers with Advance Degrees: This metric is valuable enough to stand alone as an indication of intellectual capital.

Average Age: This metric is closely tied to experience levels.

Time in Training: It is important that training is effective or this metric could give a false impression of intellectual capital formation.

Cost of Training: An indicator of effort levels in the formation of intellectual capital.

IT-Literacy: The ability of employees to effectively utilize organizational capital that contributes to overall relevance within the organization.

Common Sense Index: Internal questionnaires, polls, and interviews can be used to quantify the ability of individuals to simplify complex tasks.

Financial Focus

Total Assets: An indicator of effective use of resources, especially when paired with other metrics to form ratios and tracked over time.

Total Assets/Employee: An indicator of effective use of resources.

Budget/Total Assets: An indicator of effective use of resources.

Profits/Total Assets: An indicator of effective use of resources.

Revenue from new operations: Organizations within the DoD that charge other Governmental organizations for services (e.g. Tanker Squadrons, AMC, or the Naval Postgraduate School) may find this more useful than other organizations.

Profits from new operations: This is a good indicator of innovation in the organization.

Budget/employee: An indicator of effective use of resources.

Customer time/employee attendance: This metric indicates the institutions commitment to customer related activities.

Profits/employee: An indicator of effective management and employee utility.

Revenue from new customers/total revenue: This is a good indicator of innovation in the organization.

Return on Assets: An indicator of effective use of resources.

Returns on Assets from new operations: This is a good indicator of innovation in the organization.

Value added/employee: Skandia finds this to be the least “skewable” metric. Applying it to a not for profit organization might be more difficult.

Value added/IT-employee: Creates a multidimensional, multivariable image of how the employees and the information technology of the firm work together to add value to the firm.

Investments in IT: This metric indicates the institutions level of commitment to developing assets that will facilitate efficiency.

Value added/customer: This metric indicates how effectively the institution is developing it’s customer base.

Customer Focus

Market share: Though market share alone is not a sufficient measure of a company’s success with its customers, it is certainly a critical one. The company that gains and holds market share against the competition is obviously doing something that pleases customers.

Number of customers: This metric does not always easily apply to DoD institutions.

Annual budget/customer: An indicator of effective use of resources.

Customers lost: The metric can indicate the level of commitment an organization holds to customer service.

Average customer size: This metric may provide an indication of how effectively the institution is developing its customer base.

Customer rating: this group of three indices is Skandia's effort to capture the quality of its relationships with its customers. The first is a narrow focus way of sampling the customer's daily interface with the firm. The company, the agent, the manager, that is not there on the other end of the line is never going to be able to provide total customer service. The second index is the view from the opposite perspective: how many customers, after a long period of frustration, have finally given up? The last is right down the middle: a statistical survey of customers to gauge their overall satisfaction dealing with the company.

Customer visits: The metric can indicate the level of commitment an organization holds to customer service.

Days spent visiting customers: The metric can indicate the level of commitment an organization holds to customer service.

Customers/employees: The metric can indicate the level of commitment an organization holds to customer service and indicates the effective use of resources.

Field representatives: The metric can indicate the level of commitment an organization holds to customer service.

Field representative management: The metric can indicate the level of commitment an organization holds to customer service.

Average time from contact to customer response: The metric can indicate the level of commitment an organization holds to customer service.

Satisfied customer index: Skandia uses a questionnaire to capture the quality of its relationship with its customers.

IT investment/customer representative: The metric can indicate the level of commitment an organization holds to customer service.

IT investment/ service & support employee: This metric indicates the institutions level of commitment to developing assets that will facilitate improved customer relations.

Support expense/customer: The metric can indicate the level of commitment an organization holds to customer service and indicates the effective use of resources.

Service expense/ (customer/year): The metric can indicate the level of commitment an organization holds to customer service and indicates the effective use of resources.

Service expense/ (customer/contact): The metric can indicate the level of commitment an organization holds to customer service and indicates the effective use of resources.

Process Focus

Admin expense/total budget: An indicator of effective use of resources.

Outsourcing index: This metric can indicate a loss of intellectual capital as core competencies are lost within the organization.

Process improvement expense/budget: This is a good indicator of the commitment to innovation within the organization.

Contracts without error: An efficiency metric.

Computers/employee: This metric indicates the institutions level of commitment to developing assets that will facilitate efficiency.

Laptops/employee: This metric indicates the institutions level of commitment to developing assets that will facilitate efficiency.

Administrative expense/employee: This metric indicates the institutions level of commitment to developing assets that will facilitate efficiency.

IT expense/employee: This metric indicates the institutions level of commitment to developing assets that will facilitate efficiency.

IT capacity: a measure of overall IT system performance.

Change in IT inventory: This is the amount the company spent on new IT equipment over the course of the year.

Quality goal: The metric can indicate the level of commitment an organization holds to customer service.

Performance/ quality goal: The metric can indicate the level of commitment an organization holds to customer service and provides a measure of efficiency.

Discontinued IT inventory/IT inventory: A measure of commitment within the institution to revitalize efficiency with respect to computing capability.

Orphan IT inventory/IT inventory: This is an overall look at the company's technological vulnerability

IT capacity/employee: This metric indicates the institutions level of commitment to developing assets that will facilitate efficiency.

IT performance/employee: A measure of how much processing power resides in the hands of each employee and how effective training programs with the institution are.

Renewal & Development Focus

Competence development expense/employee: A measure of the institutions commitment to the effective training of employees.

Satisfied employee index: A measure of the employees attitudes and motivation based on qualitative reviews.

Marketing expense/employee: This metric captures an institutions commitment to marketing.

Share of training hours: A measure of the institutions commitment to improving the employee's knowledge base.

Research & Development expense/budget: This is a good indicator of innovation in the organization.

Training expense/budget: A measure of the institutions commitment to improving the employee's knowledge base.

Business development expense/admin expense: A measure of the institutions commitment to improving the size of the customer base.

Share of employee less than 40 years of age: This metric can indicate the innovation, or knowledge loss within the organization.

IT development expense/IT expense: This metric is an indicator of commitment to improving computing capacity and overall structural capital.

IT training expense/IT expense: This metric is an indicator of commitment to improving computing capacity and overall structural capital.

Educational investment/customer: A measure of the institutions commitment to improving the employee's knowledge base.

Direct communications to customer/year: This metric can indicate the institutions commitment to the customer base.

The real value in this model is obtained by analyzing trends over a period of time. Each organization must determine the applicable metrics based on obtainability, and usefulness within the institution. The final results for Skandia looked like Figure 4 below, obtained from their 1998 Intellectual Capital prototype report entitled Human Capital in transformation.

AMERICAN SKANDIA

American Skandia provides variable annuities and is the sixth-largest company in the US variable annuity market.

	1997	1996	1995	1994*
FINANCIAL FOCUS				
Return on capital employed (%) ¹⁾	21.9	27.1	28.7	12.2
Operating result (MSEK)	1,027	579	355	115
Value added/employee (SEK 000s)	2,616	2,206	1,904	1,666
CUSTOMER FOCUS				
Number of contracts	189,104	133,641	87,836	59,089
Savings/contract (SEK 000s)	499	396	360	333
Surrender ratio (%) ²⁾	4.4	4.4	4.1	4.2
Points of sale	45,881	33,287	18,012	11,573
HUMAN FOCUS				
Number of employees, full-time	599	418	300	220
Number of managers	88	86	81	62
Of whom, women	50	27	28	13
Training expense/employee (SEK 000s)	2.7	15.4	2.5	9.8
PROCESS FOCUS				
Number of contracts/employee	316	320	293	269
Adm. exp./gross premiums written (%)	3.5	2.9	3.3	2.9
IT expense/admin. expense (%)	8.1	12.5	13.1	8.8
RENEWAL & DEVELOPMENT FOCUS				
Share of gross premiums written from new launches (%)	0.9	23.7	49.2	11.1
Increase in net premiums written (%)	31.9	113.7	29.9	17.8
Development expense/adm. exp. (%)	9.8	9.9	10.1	11.6
Share of staff under 40 years (%)	76	78	81	72

¹⁾ Changed calculation methods for 1996 and 1997.

²⁾ Surrenders during the year in relation to the average mathematical reserve, net.

Figure 4. Skandia 1998 Intellectual Capital Prototype Report³³

³³ From Human Capital in Transformation, Intellectual Capital Prototype Report, Skandia 1998, 20.

VI. SUMMARY

Many corporations in America and around the world have found that measuring and managing intellectual capital can provide them with a competitive advantage. Governmental entities can expect to reap similar benefits if they apply the same concepts. The difference in a government institution is that the goal is to improve relevance vice profits.

While the idea of measuring intangible assets and placing them on a balance sheet is appealing, no credible method exists for doing this. The reasons are numerous, and have been discussed at length by various authors.

Adam Smith determined that human capital in different localities is valued in different ways. Andriessen made the point that our method of double entry bookkeeping and the absence of rival assets made entering intellectual assets on the balance sheet akin to comparing apples and oranges—It just doesn't work.

While it may not be possible to quantify intangibles like intellectual capital in ways that allow us to compare the value of the assets between one institution and another, it is nevertheless important to track and manage these assets within an institution. The deliberate management of knowledge assets in an economy that is becoming more and more knowledge based is sound management.

The four main approaches for measuring intangibles (Market Capitalization Method, Scorecard, Return on Assets, and Direct Intellectual Capital Method) have various advantages and disadvantages. Overall, the Scorecard method seems most appropriate method for a government entity, and a modified version of the Skandia Navigator may be the best method for governmental institutions to use when tracking and managing intellectual capital while trying to increase their relevance.

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